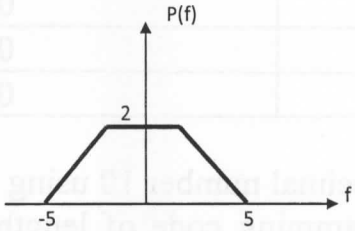
Course Title: Digital Comm. Systems	Course Code: EEC3220	Year: 3ed
Date: 7 / 6 / 2014	Allowed Time: 3 Hours	No. of Pages: (2)

Answer the following Questions

Question 1: **[18 Marks]**

a. Assume you have the analogue signal shown. Draw the frequency domain of the digital signal when the sampling rate is less than 10% as compared to the Nyquist rate. Comment.



b. Show graphically how to get PWM from PAM signal using logic concepts.
c. Explain the American Hierarchy to convert from Short Haul to Long Haul PCM system providing the possible data rate that could be accommodated in each stage.
d. Explain the desirable properties of line codes.

Question 2: **[18 Marks]**

a. Explain the Hartley's law and Shannon's limit considering the information capacity.
b. Explain how Minimum shift keying is used to conserve FSK bandwidth.
c. Deduce the truth table, then draw the phasor and constellation diagram for QPSK.
d. Explain the operation of Costas Loop for carrier recovery assuming the transmission of binary PSK signal.

Question 3: **[18 Marks]**

a. Explain the multiplexing of 3 voice channels extends from 100 to 3000 Hz.
b. Explain in details the modulation plan of typical FDMA system termed as FDM/FM/FDMA.
c. Explain the concepts of CDMA indicating its advantages.
d. What do you know about demand assignment multiple access, then show its advantages?

Question 4: : **[18 Marks]**

a. Design an efficient Hoffman code to the shown 6 symbols if its probability of occurrence was as follows:

The symbol	The Probability of Occurrence
X1	0.30
X2	0.24
X3	0.20
X4	0.12
X5	0.10
X6	0.04

b. How to represent the decimal number 10 using Hamming code (7,4).
c. Consider the use of Hamming code of length (7,4). If you receive the code 1100110 wrongly as 1110110, How to detect and correct it?
d. According the sampling concepts you have studied, show how many minutes of speech stereo sound you could store in a one CD floppy disk of size 700 M bytes.

Question 5: **[18 Marks]**

a. Explain the construction and operation of Carrier Sense Multiple Access Networks.
b. Draw an example of data stream using Manchester PCM formats indicating the concept by which the transmitting terminal ensures the end of the packet.
c. Illustrates the concepts and the operation of Token Ring Networks.
d. Comment on the contention in both CSMA/CD and Token Ring Networks.

With best wishes

Course Examination Committee
Assoc. Prof. Mahmoud Ahmed Attia Ali
Dr. Amr Hosien Hosien Abdallah
Assoc. Prof. Salah El Dean A Khameece
Dr. Intisar Saieed

Course Coordinator:
Assistant Prof. Mahmoud Ahmed Attia Ali

Faculty of Engineering
Tanta University
Electronics and Electrical Comm. Dept.

كلية الهندسة
جامعة طنطا
قسم هندسة الإلكترونيات والإتصالات الكهربية

3rd year | **Final Exam** | **Second Term 2013-2014**
[85 Marks] | **Electromagnetic waves (2)** | **Code (EEC 3214)**

Time (3 hours), (Exam in two papers)

Answer the following five questions:

Question (1) [17 Marks]

a) **Prove** that the magnetic potential vector $A(r)$ is given by

$$A(r) = \frac{\mu}{4\pi}\iiint J(r')\left(\frac{e^{-jBR}}{R}\right) \quad dv$$

b) **Explain** the following terms with **equations** and **drawing**:
1. Pointing vector.
2. Radiated power density $\bar{P}_{av}$.
3. Average radiated power W_{rad}.
4. Antenna directivity.
5. Antenna effective length.

Question (2) [17 Marks]

a) For short dipole antenna, **prove** that the magnetic potential A_z is given by

$$A_z = \frac{\mu}{4\pi}\frac{I_o L}{2}\left(\frac{e^{-jBr}}{r}\right) \quad \hat{z}$$

b) For short dipole antenna, **Find;**
1. The electric field component E_θ
2. The average radiated power $\bar{P}_{av}$
3. The total radiated power W_{rad}
4. Antenna effective length L_{eff}
5. **Plot** the **E-plane** and the **H-plane** patterns if the dipole antenna is oriented in **Z-direction**.

Question (3) [17 Marks]

a) If the general form of the magnitude of the electric field component of the long dipole is given by

$$|E_\theta| = 60\,\frac{I_m}{r}\left[\frac{\cos\left(\frac{\beta L}{2}\,cos\theta\right) - \cos(\frac{\beta L}{2})}{sin\theta}\right]$$

1. **For $\lambda/2$ dipole** antenna, **prove** that its directivity $D = 1.64$, and its effective area $A_{eff} = (0.13\lambda^2)\ m^2$.
2. Plot the E-plane and H-plane patterns of the $\lambda/2$ dipole antenna.

Question (4) [17 Marks]

a) **Draw** the travelling wave antenna and **state** its advantages and disadvantages.

b) **Explain** how the rhombic antenna used to solve the travelling wave antenna problems.

c) **Write down** the equation of the electric field component E_θ of the travelling wave antenna, then **derive** an expression for the location of nulls and peaks.

d) For a $L = 4\lambda$ travelling wave antenna, **plot** its radiation pattern **indicating** the location of nulls, location of peaks, and the relative amplitudes.

Question (5) [17 Marks]

a) **Explain** with drawing the following terms:
   1. Ground or surface waves.
   2. Tropospheric waves (bending, scattering, and ducting).
   3. Ionospheric waves.

b) **Derive** an expression for the free space transmission loss L_{fs}.

With my best wishes

Dr/ Amr Hussein

Course Title: Digital Signal Processing	Course Code: EEC32**	Third Year
Date: 14-6-2014	Allowed time: 3 hrs	No. of Pages: (2)

Answer all the following questions:

Question (1) (10 Marks)

1. Compute the convolution and the cross correlation for the following sequences:

a. $x(n) = \{1,2,3,1\}, \qquad y(n) = \{1,2,1,-1\}$

b. $x(n) = \begin{cases} \frac{1}{2}n & 0 \le n \le 6 \\ 0 & otherwise \end{cases}$ *and* $h(n) = \begin{cases} 1 & -2 \le n \le 2 \\ 0 & otherwise \end{cases}$

Question (2) (20 Marks)

1. The input and output of an LTI system are given by:

$x(n) = 3(-\frac{1}{2})^n u(n)$ *and* $y(n) = -(\frac{1}{2})^n u(n) - 4.(2)^n u[-n-1].$

find the transfer function H(z) and ROC.

2. If the input and output to a LTI system are given as:

$x(n) = 5u(n)$ *and* $y(n) = 2(\frac{1}{2})^n + 3(-\frac{3}{4})^n u(n).$ Determine :

a. The system transfer function H(z).

b. The response h(n) of the system.

Question (3) (20 Marks)

1. Find the inverse Z-transform of the function

$$X(Z) = \frac{1 - \frac{1}{2}z^{-1}}{1 + \frac{3}{4}z^{-1} + \frac{1}{8}z^{-2}} \qquad |z| > \frac{1}{2}$$

2. For the causal LTI system shown in Figure (1), Determine the following:

a. Determine the characteristic function H(z).

b. Check the stability of the system.

c. The output of the system if the input $x(n) = (-1)^n u(n)$ and the initial values are $y(-1) = 1, \qquad y(-2) = -1.$

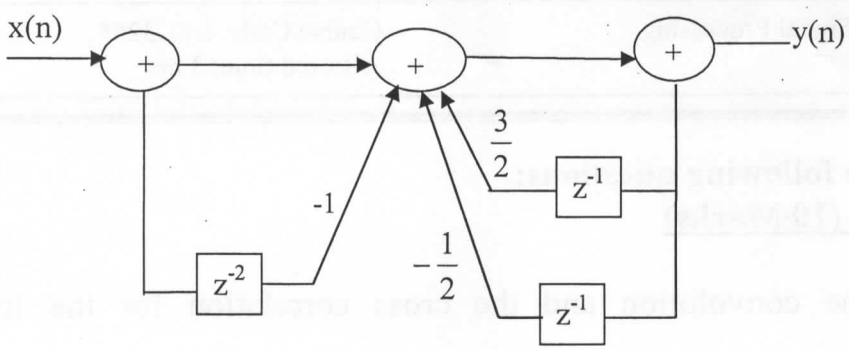


Figure (1)

Question (4) (20 Marks)

1. Sketch the *direct form II* realization for the filter given by $H(z)=\frac{2z^2+z-2}{z^2-1}$.

2. Realize a linear phase *FIR filter* with the following transfer function:

$$H(z)=1+\tfrac{1}{2}z^{-1}-\tfrac{1}{4}z^{-2}+\tfrac{1}{2}z^{-3}+z^{-4}.$$

3. It is required to design a digital ***low pass filter*** to approximate the following transfer function:

$$H(s)=\frac{1}{s^2+\sqrt{2}s+1}$$

Using the BZT method, obtain the transfer function $H(z)$ of the digital filter, assuming a 3dB cut off frequency of 150 Hz and a sampling frequency of 1.28 KHz.

Good Luck

Course Coordinator: **Dr.*Entesar Said***

TANTA UNIVERSITY — FACULTY OF ENGINEERING
DEPARTMENT OF COMMUNICATIONS — 2ND SEMSTER, 3RD YEAR, 18-6-2014
OPTICAL COMMUNICATIONS — TIME: 3 HOURS
SECOND TERM EXAM — TOTAL MARKS: 75

Answer the following questions

Question (1)

(a) State the advantages of Modified Chemical Vapor Deposition (MCVD). (5)

(b) Define the following terms: (5)

(Radiance – Cleaving – flame hydrolysis – Hackle – Lip)

(c) A laser diode has lateral ($\phi = 0°$) and transverse ($\phi = 90°$) half power beam widths of $2\theta = 60$ and $30°$, respectively. What are the transverse and lateral power distribution coefficients for this device? (5)

Question (2)

(a) Compare between the extrinsic losses of the fiber joins and the intrinsic ones. (5)

(b) Explain –with draw – the possible lensing schemes used to improve optical source-to-fiber coupling efficiency. (5)

(c) Explain -with draw- the vapor axial deposition technique. (5)

Question (3)

(a) "The objective of the cable is to protect the installed fiber from anything that may damage it" explain that. (5)

(b) State the principal requirments of a good connector design. (5)

(c) How we can purify the silica? (5)

Question (4)

(a) State the three general ways of joining fibers, and what is the common requirement of all three methods. (5)

(b) What is meant by the equilibrium aperture? Draw the relation between the numerical aperture and the fiber length. (5)

(c) A single mode fiber has a normalized frequency V =2.4, a core refractive index n_1 =1.47, a cladding refractive index n_2 =1.465, and a core diameter 2a = 9 μm. Find the insertion losses of a fiber joint having a lateral offset of 1 μm. (5)

Question (5)

(a) State the three problems of the Outside Vapor Deposition (OVD). (5)

(b) State 5 types of the fiber-splicing techniques. (5)

(c) An LED diode with a circular emitting area of radius 20 μm has a lambertian emission pattern with a 100-W/cm^2.sr axial radiance at 100-mA drive current. How much optical power can be coupled into a step-index fiber having a 100- μm core diameter and NA = 0.22? How much optical power can be coupled this source into a 50- μm core diameter graded-index fiber having α =2.0, n_1 = 1.48, and Δ = 0.01? (5)

WITH BEST WISHES

Dr. Mohamed Salah

الفرقة الثالثة

Tanta University
Faculty of Engineering
Dept. of Electronics & Communication Eng.
Subject: Microprocessor Applications in Communications Systems

Date: 21/6/2014
Time allowed: 180 Min.
Full Mark: 75 Mark
Final Term Exam (2nd Semester)

Answer The Following Questions (ملحوظة هامة: الأسئلة فى ورقتين)

The First Question

(a) Define and briefly state the Function of:
1- USB.
2- AGP.

(b) Compare between 80486DX, Pentium, Pentium Pro, and Pentium 4 in terms of number of execution units (CPU) and size of cache memory.

(c) Draw a block diagram of the personal computer showing:
1- The structure of the microprocessor-based personal computer system.
2- Information about the memory and operating system used in many microprocessor-based computer systems.

The Second Question

(a) How many descriptors are accessible in the global descriptor table in the protected mode?

(b) For a Pentium 4 descriptor that contains a base address of 00280000H, a limit of 00010H, and G = 1, what starting and ending locations are addressed by this descriptor?

(c) If the DS register shown in Fig. 1. contains **0020**H in a protected mode system, which global descriptor table entry is accessed.

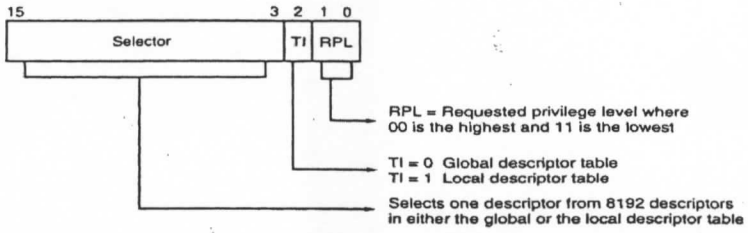


Fig. 1. Segment register during protected mode operation.

The Third Question

(a) What is wrong with:
1- The **MOV BH,CX** instruction.
2- The **MOV DS,SS** instruction.
3- The **MOV [BX],[DI]** instruction

(b) Select an instruction for each of the following tasks:
1- copy EBX into EDX
2- copy BL into CL

(c) Suppose that DS = B1300H, SS = 1400H, BP = 1500H, and SI = 0100H. Determine the address accessed by each of the following instructions, assuming real mode operation:
1- MOV EAX,[BP+200H]
2- MOV AL,[BP+SI-200H]

DS = B1300H, SS = 1400H, BP = 1500H, and SI = 0100H.

The Fourth Question

(a) Which registers move onto the stack for:
   1- the PUSHA instruction.
   2- a PUSHAD instruction.

(b) Develop a sequence of instructions that move the contents of data segment memory locations NUMB and NUMB+1 into BX, DX, and SI.

(c) Write a program to fill the 256 bytes block of memory in the extra segment beginning at address BLOCK with the data byte 20H (ASCII space).

With my best wishes